

There's Gold in Them Thar Towers

Broward County Water Resource Task Force

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Cooling Tower Use in Broward

- The Broward County Property Appraiser list
 - Commercial Properties – 21.7 Billion Sq. Ft.
 - Larger than 20,000 Sq. Ft. – 234 million Sq. Ft.



A/C Rule of Thumb

- Retail Buildings = 250 - 300 sq. ft. per ton of cooling
- Office Buildings = 400 - 500 sq. ft. per ton of cooling
- Condominiums = 500 - 600 sq. ft. per ton of cooling
- Average base of 425 sq. ft. per ton
- This average is $234,685,169 \text{ sq. ft.} / 425 \text{ sq. ft. per ton} = 552,200 \text{ tons total}$



How Much Condensate is Generated

- The condensate from these air conditioning systems can be reclaimed and used for make-up water for the cooling towers in lieu of potable water from the utility company. The rule of thumb would be 3,434 gal. per day per 1,000 tons, therefore the water reduction from the utilities would be $(552,200 \text{ tons} / 1000 \text{ tons}) * (3,434 \text{ gals per day} / 1,000,000) = 1.9 \text{ MGD}$.



What happens to the A/C Condensate in These Buildings



What Is Cooling Tower Blow-Down

- Towers Cool by Evaporation
- Make-up water adds Minerals
- Evaporation increases concentration of Minerals
- Blow-down removes minerals and lowers concentration of Minerals



How Much Blow Down

- Average Cycles of Concentration = 5 cycles
- Average operating time per Bldg. = 16 hours per day
- Average annual cooling tower load = 7 degrees Delta-T (70%)
- Blow-down Rate Calculation:
 - 1.8 gal/hr/ton divided by (cycles-1) x tons x hrs/day = Gallons of Bleed-off per day.
 - $1.8 / (5 - 1) = .45 \times 552,200 \times 16 \times 70\% \approx 2.8 \text{ MGD}$



What Happens to the Blow- Down



What Should be Done

- Collect A/C condensate and return to Cooling Towers for makeup
- Require no bleed tower water treatment systems – at least two are on the market
- Possible water savings – 14 MGD or one \$75 million RO plant
- Possible sanitary treatment of 10 MGD



Issues to resolve

- Incentives vs Mandate
- Time line by date vs Tower change out
- Promotion
- Remember 6MGD RO stand alone plant \approx \$42M or addition \approx \$18M

